

Systematic Review: Scoring Triage in Pandemic Covid-19

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ABSTRACT

Background: Patients with emergency conditions will get the first health service in the Emergency Room (IGD). The emergency room nurse has an important role in assessing and determining the severity of the patient. The nurse determines the priority of action and the need for treatment in Intensive Care Unit (ICU) using triage. One of the triage that can be done is triage scoring to facilitate nurses in determining high-risk and low-risk patients.

Purpose: To find out the triage scoring used during the pandemic.

Methods: Literature search is conducted using the PICO framework. This systematic review is limited to articles published from 2019-2021 with articles in English. The database used is Google Scholar, PubMed, Science Direct, and ProQuest which using the keywords score, triage, pandemic and emergency care.

Results: Based on the three articles reviewed, an overview of the use of triage scores during a pandemic is obtained using the SODA score, modified PRIEST and double triage and telemedicine protocols. Giving the triage score can make it easier for health workers to identify high-risk patients and prevent unexpected events.

Conclusion: Triage scoring can be applied at Covid-19 referral hospitals which helps nurses determine priorities and prevents special mortality in Indonesia, which is experiencing the second wave

Keywords: Score, Triage, Pandemic

Introduction

Patients with emergency conditions will get the first health service in the Emergency Room (ER). The ER is one of the main entrances for patients who need treatment at the Hospital and is the main gate for the entry of emergency patients (M.A. Sari, Erianti, & Marni 2020). For this reason, it is necessary to provide adequate assistance to emergency sufferers both in daily situations or during disasters (Febrina & Sholehah 2018). Successful handling to save lives or prevent disability from the scene, en route to hospital assistance (Gustia & Manurung 2018). Nurses are one of the parties who contribute to the actions of patients in the ER.

The emergency room nurse has an important role in assessing and determining the severity of the patient. According to Musliha (2010); Gustia & Manurung (2018) states that nurses must be able to manage a good flow of patients with a limited

number of rooms, setting priorities, especially to reduce the amount of morbidity and mortality, as well as labeling and categorizing. The number of emergency room visits in Indonesia was 4,402,205 patients (13.3%) of all visits to General Hospitals (Minister of Health of the Republic of Indonesia 2015). So with a high number of visits, the role of nurses is needed in conducting assessments to assess emergency conditions, especially during the pandemic period through the triage process.

Nurses carry out a triage process to streamline time. Triage is a special process of sorting patients based on the severity of injury or illness to determine priority medical emergency care and the need for intensive care in the ICU (Gustia & Manurung 2018). According to Brooker (2008); Gustia & Manurung (2018), in triage a priority system is applied to anticipate/select which one should take precedence regarding treatment that refers to the levels of the soul so that a selection priorities based on considerations is

needed which can be deadly in minutes, can die in hours, trauma light and dead. So a triage service procedure is needed so that patient handling is not too long.

Nurses perform triage service procedures by scoring. Procedures in triage such as patients coming to be received by emergency room paramedics/paramedics, in the triage room a brief and quick examination (at a glance) is carried out to determine the degree of gravity by nurses, if the number of patients/victims is more than 50 people, then triage can be done outside the triage room in front of the ER building) and patients are distinguished according to their severity by giving a color code (Gustia & Manurung 2018). Determination of color coding can be done by scoring triage.

Nurses use triage scoring. At the end of 2019, the world was shocked by an incident that made many people nervous, known as the corona virus (covid-19) (Putri 2020). Coronavirus Disease 2019 (COVID-19) is a new type of disease that has never been previously identified in humans. The virus that causes COVID-19 raises Sars-CoV-2. President Joko Widodo reported that he first found two cases of COVID-19 infection in Indonesia on March 2, 2020 (Djalante et al. 2020). WHO declared COVID-19 on March 12, 2020 a pandemic situation. At this time there was an increase in the number of patients to 13,000 which resulted in the emergence of patients in the ER (Maulaa 2021). While in Indonesia, the fact is that the application of triage is still lacking and insufficient. This is because Indonesia does not yet have a standard national standard regarding the triage system so that in the application of triage each hospital can be different (Firdaus 2017). Provisions for using triage during a pandemic in Indonesia using Severe Acute Respiratory Infection (SARI) with an assessment of the level of urgency using A-B-C-D (Rahayu & Sahli 2020).

Based on this, the author is interested in conducting a literature study by making a systematic review of "The use of various types of triage scoring during the covid-19 pandemic". The author focuses on finding articles on pandemic triage with the management of triage scoring used and having triage scoring outcomes in order to improve preventive measures to determine future risk and low risk..

Methods

This systematic review uses the PICO method with the description P (patient, population, problem)= determination of triage during a pandemic, I (intervention, prognostic factor, exposure) = use of Fast Track Triage with SODA score, Modified PRIEST Score, double triage and telemedicine protocol, COSA score, Pandemic Medical Early Warning Score (PMEWS), Simple Triage Scoring System (STSS) and Confusion, Uremia, Respiratory rate, Blood pressure and age 65 (CURB-65), C (comparison, control), O (outcome) = increasing preventive efforts by diagnosing high-risk patients and reducing resources by identifying low-risk patients. Keywords used. The keywords used by the author in the search for articles are "score", "triage", "pandemic" and "emergency care". Databases include Google Scholar, PubMed, ProQuest, and Science Direct. Inclusion criteria include articles published in English, articles published in the last 3 years from 2019 to 2021, articles or journals are available and can be downloaded in full text, articles are articles that explain the use of triage scores during a pandemic in the ER and research outputs are explanations use of triage scoring during a pandemic. While the exclusion criteria were articles in the form of a systematic review or meta-analysis, and articles that discussed triage during a pandemic but were not in accordance with the topic of triage scoring that was being compiled.

This research is a systematic literature study by collecting articles relevant to Indonesian and international journals. The articles obtained consisted of Google scoolar (n=557), Pubmed (n=43), Science Direct (n=54) and ProQuest (n=95). The total articles obtained from the search results amounted to 749 articles. The author screened the articles by reading the abstract and obtained 19 articles that had the potential to be reviewed, but there were 11 journals whose research output was not appropriate, full text was not available, did not use retrospective design and scoring methods other than in the emergency room. Based on the inclusion criteria set by the author, 8 articles were screened for full paper. The author finally found 5 articles that met the criteria for analysis.

Results and Discussion
(Hasil dan Pembahasan)

1. Fast track triage for COVID-19 based on a population study: The SODA score							
Author	Design	Variables	Subject	Intervention	Data analysis	Result	Strength/ weakness
Lopez-Pais et al. (2021)	Retrospective design	Variable independent: The SODA score (based on Sex, O ₂ saturation, presence of Diabetes, and Age)	447. 979 confirmed positive Covid-19 patients at the University Hospital	Patients are given SODA scores to assist nurses in diagnosing high-risk and low-risk patients, making it easier for nurses to determine triage color codes in the form of red, yellow and green.	Pearson chi square	The results of this study indicate that there are four components in triage scoring with good accuracy values for predicting unexpected events (AUC 0.858, CI: 0.82-0.98, p <0.001). In addition, the use of SODA scores showed accuracy in estimating mortality (AUC 0.89, CI: 0.58–0.94, p < 0.001). So that the use of triage with the SODA score is proven to have good accuracy in identifying unexpected events such as patients who have high or low risk.	Strength: The researcher explained clearly the flow in using the SODA score to determining the triage color code. Weakness: There wasnt patient response in giving SODA score..
2. Modified PRIEST score for identification of very low-risk COVID patients							
Author	Design	Variables	Subject	Intervention	Data analysis	Result	Strength/ weakness
Suh et al. (2021)	Consecutive and retrospective design	Variable Independent: Modifikasi Pandemic Respiratory Infection Emergency System (PRIEST) score	365 confirmed COVID-19 patients at the North Manhattan ER	Patients are given PRIEST modifications to determine the patient's condition, PNEWS is a new form of score from NEWS but in the PRIEST modification there are additional variables of age, gender and activity level to make it easier for nurses to group high and low risk patients.	Validation cohort dengan AUC (Area Under Curve)	The results of the study using the ten-component scoring type with the PRIEST modification showed a very good sensitivity value distinguishing high-risk and low-risk patients with an AUC value of 0.86 (95% CI: 0.81 to 0.91) with a specificity of 47.2% (95% CI: 41.1% to 53.2%) at that threshold, the positive and negative likelihood ratios were 1.86 (1.64 to 2.10) and 0.05 (0.01 to 0.33). So the use of modified PRIEST score proved to have a good interpretation in preventing unexpected events and sensitivity in preventing mortality.	Strength: The researcher explained clearly the components of the modified PRIEST score Weakness: The researcher did not explain the flow of using the modified PRIEST score in determining the triage color code.
3. A double triage and telemedicine protocol to optimize infection control in an Emergency Department in Taiwan during the COVID-19 Pandemic: retrospective feasibility study							
Author	Design	Variables	Subject	Intervention	Data analysis	Result	Strength/ weakness
Lin et al. (2020)	Retrospective design	Variable independent: Double triage and telemedicine protocol	198 patients were divided into two groups with details of 93 patients in the telemedicine group and 105 patients in the conventional	The patient will go through double triage. The first triage was screening history of travel, occupation, contact, and cluster (TOCC) in the open, then re-screened with the Taiwan Triage and Acuity Scale (TTAS) so that respondents were divided into 5 triage classifications and ended with triage screening with health workers both individually conventional or telemedicine. The purpose of this study is to evaluate advantages and protocols of telemedicine in preventing the spread of COVID-19.	Pearson chi square	The results of the study using triage twice resulting in five classifications obtained a comparison of the two groups of exposure time, the telemedicine group was shorter than the conventional time (4.7 minutes, SD 2.4, vs. 8.9 minutes, SD 4.3; P<.001). While the time to evaluate the telemedicine group was longer than the conventional group (12.2 minutes, SD 3.5, vs. 8.9 minutes, SD 4.3; P<.001). When viewed from the questionnaire scores, the comparison between the telemedicine group and the conventional group was 4.7/5 and 4.5/5.	Strength: The researcher explained clearly the flow in the use of double triage and telemedicine protocol to the determination of the triage color code. Weakness: The study didnt explain in detail the use of the Taiwan Triage and Acuity

group						Scale (TTAS).	
4. Development and validation of a prognostic COVID-19 severity assessment (COSA) score and machine learning models for patient triage at a tertiary hospital							
Author	Design	Variables	Subject	Interven tion	Data analysis	Result	Strength/ weakness
Schönin g et al. (2021)	<i>Retr ospe ctive desi gn</i>	Variable indepen dent: <i>COVID- 19 severity assessmen t (COSA) score and machine learning models</i>	657 patients with details of 198 patients from 1 February to 31 August 2020 'first wave' and 1 September to 16 November 2020 'second wave' at Ben Group Hospital,Swizer land	Patients were given a COSA score to diagnos e which patients were at high risk and low risk.	<i>Validati on cohort dengan AUC (Area Under Curve)</i>	The results of the study with a COSA score that contained ten scoring components showed a low sensitivity value with an AUROC value of 0.85, positive prediction value (PPV) 0.91, negative prediction value (NPV) 0.81 compared to training cohort AUROC 0.94, PPV 0.97, NPV 0.80. Although it has a low AUC value, it has a good predictive value for mortality.	Strength: The researcher explained clearly the flow in the use of the COSA score. Weakness: The researcher didnt explain the use of the COSA score in determining the triage color code.

The triage score used can be done in several ways. The triage scores on the four articles reviewed conducted face-to-face assessments between patients and health workers or referred to as conventional and one article conducted an assessment on patients who had been classified as suspect covid with conventional or telemedicine. The assessment using telemedicine was carried out by nine doctors and four senior residents who had been trained in the Telemedicine Interview System (TIS). Telemedicine uses U Meeting (CyberLink Corp) as communication software, patient data confidentiality is maintained using end-to-end encryption and applications that are connected to the government. The telemedicine procedure is that after the patient agrees to be interviewed using video, the doctor will prepare for the interview using TIS. Then the doctor will show the X-ray results of the patient through a screen located beside the patient accompanied by an explanation of the X-ray results. After the interview using TIS, the doctor will use PPE to carry out the examination that is lacking and take PCR specimens. Although the triage procedure is electronic, the sensitivity value is as high as the conventional procedure.

The use of various scores in determining triage can be determined and used according to the context and respondents of the research conducted. Scoring triage with SODA score, modified PRIEST score, double triage and telemedicine protocol can be used in the ED. Meanwhile, soring triage with COSA score, PMEWS, STSS and CURB-65 is used for initial screening before patients enter the ICU. The use of the SODA score and double triage has the advantage of assessing patients for the first time coming to the hospital, especially the use of the SODA score which is more appropriate to use as a fast-track patient examination because it only takes less than one

minute. Meanwhile, the modified PRIEST score, COSA score, PMEWS, STSS and CURB-65 were used to identify patients requiring ICU care and the possibility of mortality (Suh et al. (2021); Demir & Ilhan (2021)). The five triage scores have the same goal to facilitate the determination of high-risk patients and as a tool to overcome the possibility of a second wave.

Indonesia is experiencing a second wave. COVID-19 was first reported in Indonesia on March 2, 2020 as many as two cases (World Health Organization 2020). Data on June 24, 2021, shows that there are 20,574 positive confirmed cases and 9,201 deaths (Ministry of Health of the Republic of Indonesia 2021). Currently, the spread of SARS-CoV-2 from human to human is the main source of transmission so that its spread becomes more aggressive. Transmission of SARS-CoV-2 from symptomatic patients occurs through droplets released when coughing or sneezing (Han & Yang 2020). The pathogenesis of SARS-CoV-2 is still not widely known, but it is suspected that it is not much different from that of SARS-CoV which is more widely known (Li, Geng, Peng, Meng, & Lu 2020).

The pathogenesis of covid in humans. SARS-CoV-2 primarily infects cells in the airways lining the alveoli. SARS-CoV-2 will bind to receptors and make its way into cells. The glycoprotein contained in the viral envelope spike will bind to a cellular receptor in the form of ACE2 in SARS-CoV-2 (Susilo et al. 2020). When associated with where ACE2 receptors are found, it is clear that ACE2 expression is distributed in various tissues and organs of the body such as alveoli, colon, duodenum, jejunum, vascular endothelial cells, myocardium, proximal tubular cells to placental villi in syncytiotrophoblasts (Ikawaty 2020). As a result, if there is an interaction between SARS-CoV-2 and ACE2

receptors in certain tissues or organs, the clinical manifestations will be in accordance with the affected tissues/organs. In patients with severe symptoms who have clinical manifestations found interleukin-1 beta (IL-1 β), interferon-gamma (IFN- γ), inducible protein/CXCL10 (IP10) and monocyte chemoattractant protein 1 (MCP1) which causes a cytokine storm. Indonesian Lung Doctor (PDPI) 2020). Patients with cytokine storms will develop ARDS and require treatment in the ICU (Fitriani 2020). In addition, there are several other factors that influence the onset of clinical manifestations and severity such as age, gender, obesity, diabetes, hypertension, the presence or absence of comorbidities, and patients receiving immunosuppressive treatment (Satria, Tutupoho, & Chalidyanto 2020). For this reason, it is necessary to properly assess patients with suspected COVID using easily assessed factors such as age, gender, obesity, diabetes, hypertension, which are contained in the SODA score, modified PRIEST score, double triage, COSA score, PMEWS, STSS and CURB-65. The use of triage scores makes it easier for nurses to identify patients with fast duration.

Research conducted by Ruampakk & Katuuk (2019) states that the implementation of triage greatly affects response time, if triage is not carried out properly it will slow down the response time that will be received by the patient so that it will increase the risk of organ damage or disability, and even to death. on patient death. According to Sumarno, Meggy Sukma S, Amatus Yudi Ismanto (2017) stated that the factors for providing optimal triage from health workers in the ER are having good knowledge about triage, a positive attitude towards triage and carrying out triage according to procedures. In addition, other factors are triage tools that have high sensitivity. Especially in Indonesia, which is experiencing an increase in the number of positive Covid patients, so it requires accurate triage and fast duration. So when viewed from the advantages and disadvantages of giving a triage score in the ER, the easiest to apply in Indonesia is the SODA score because the soda score assessment has high sensitivity and can be done in less than one minute in duration which is in accordance with the second wave situation in Indonesia, while the score for The ICU triage that is easy to apply is PMEWS because it is easy to do with the use of a bed side monitor and has a high sensitive value.

**Conclusion
(Simpulan)**

Patients with emergency conditions will get the first health service at the Emergency Room (IGD).

The emergency room nurse has an important role in assessing and determining the severity of the patient. Nurses determine the priority of action and the need for care in the Intensive Care Unit (ICU) using triage. One of the triage that can be done is triage scoring to facilitate nurses in determining high-risk and low-risk patients. Triage scoring that can be done is SODA score, PRIEST modification, double triage and telemedicine protocol, COSA score, PMEWS, STSS and CURB-65. In addition to making it easier for nurses, triage scoring can be done in a fast duration.

Based on the literature review above, the author proposes several suggestions for several parties and recommendations for further research as follows; 1) Educational institutions are expected to incorporate the results of this research into learning the use of triage during the COVID-19 pandemic, 2) for nursing knowledge, emergency room nurses are expected to consider the use of triage scoring to deal with the second wave, 3) For the next researcher, for further researchers, they can conduct similar research by adding other databases and multiplying articles on the use of triage during the pandemic.

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